

CLAIMS

1. An integrated search processor receiving a signal comprised of a group of spread spectrum modulated call signals sharing a common frequency band, said integrated search processor comprising:
- a sample buffer for storing a limited number of data samples of said group of spread spectrum modulated call signals wherein each of said spread spectrum modulated call signals comprises a series of bits encoded in groups of a fixed length into a series of symbols having a transmission rate and wherein said data samples are stored at a rate corresponding to said transmission rate;
 - a PN sequence buffer for storing a limited number of PN sequence data chips wherein said PN sequence data chips correspond to a PN sequence used to modulate at least one call signal in said group of spread spectrum modulated call signals;
 - a despreader for correlating a portion of said data samples of said group of spread spectrum call signals stored in said sample buffer with a portion of said PN sequence data chips stored in said PN sequence buffer and for producing a correlated output corresponding to a single symbol; and
 - a transform engine for decoding said correlated output to produce an estimate of said series of bits wherein said transform engine decodes said correlated output at a rate higher than said transmission rate.
2. The integrated search processor of claim 1, wherein said sample buffer is capable of storing two symbols worth of said data samples and wherein said PN sequence buffer is capable of storing four symbols worth of said PN sequence data chips.
3. The integrated search processor of claim 1, wherein each symbol in said series of symbols is comprised of a series of code bits and wherein, in said at least one call signal, each of said code bits is modulated by a plurality of said PN sequence data chips and wherein said limited number of data samples stored in said sample buffer are stored such that two of said data samples are stored for each of said PN sequence data chips.
4. The integrated search processor of claim 1, wherein said estimate of said series of bits comprises a probability corresponding to each possible value of said groups of said fixed length, further comprising a maximum detector for receiving said estimate and providing a soft decision

2 output value indicative of a maximum energy level of said correlated
2 output.

2 5. The integrated search processor of claim 1, wherein said rate at
2 which said transform engine decodes said correlated output is 32 times
higher than said transmission rate.

2 6. The integrated search processor of claim 1 further comprising a
2 demodulation element for producing despread call data wherein said
transform engine decodes said despread call data.

2 7. The integrated search processor of claim 1 wherein said series
2 of bits are Walsh encoded in said groups of said fixed length.

2 8. The integrated search processor of claim 7 wherein said
2 transform engine is a fast Hadamard transformer.

2 9. The integrated search processor of claim 4 further comprising
2 an accumulator for summing successive ones of said soft decision output
values.

2 10. The integrated search processor of claim 1 further comprising a
2 search controller for providing signaling information.

2 11. The integrated search processor of claim 9 wherein a plurality
2 of said series of symbols are grouped into a power control group wherein
each symbol in said power control group has a common transmitted power
4 level.

2 12. The integrated search processor of claim 11 wherein said
2 accumulator sums said soft decision output values corresponding to
symbols having a common power control group.

2 13. The integrated search processor of claim 1 wherein said
2 despreader produces said correlated output at said rate higher than said
transmission rate and wherein each of said correlated outputs corresponds
4 to a time delay offset from a zero offset reference time

14. The integrated search processor of claim 10 wherein said
2 sample buffer is comprised of an even and an odd sample buffer wherein if
the previous data sample is stored in said even sample buffer then the
4 subsequent data sample is stored in said odd sample buffer and if the
previous data sample is stored in said odd sample buffer then the
6 subsequent data sample is stored in said even sample buffer.

15. The integrated search processor of claim 1 wherein each symbol
2 in said series of symbols is comprised of a series of code bits and wherein, in
said at least one call signal, each of said code bits is modulated by four of said
4 PN sequence data chips and wherein said limited number of data samples
stored in said sample buffer are stored such that two of said data samples are
6 stored for each of said PN sequence data chips, and wherein each sample is
four bits.

16. A method of receiving a signal comprised of a group of spread
2 spectrum call signals sharing a common microfrequency band in a modem
operating under control of a modem microprocessor, and isolating one of
4 said call signals from among said group to determine a call signal strength at
a path delay time offset from a zero offset reference time, said method
6 comprising the steps of:

storing PN sequence data bits in a PN sequence buffer;

8 storing a first received set of call signal samples in a sample buffer
having a limited size;

10 despread a first fixed length set of said call signal samples from said
sample buffer corresponding to a first path delay time with a first set of PN
12 sequence data bits from said PN sequence buffer to produce a first despread
output;

14 storing a second received set of call signal samples in said sample
buffer; and

16 despread a second fixed length set of call signal samples from said
sample buffer corresponding to a second path delay time with said first set of
18 PN sequence data bits from said PN sequence buffer to produce a second
despread output;

20 wherein said second fixed length set of call signal samples comprises a
large number of the same call signal samples as said first fixed length set of
22 call signal samples and wherein the length of said first and second received
set of call signal samples is a fraction the fixed length of said first and second
24 fixed length set of call signal samples.

17. The method of claim 16 for receiving and isolating one of said
2 call signals from among said group of call signals wherein the step of
despreading said first fixed length set of call signal samples from said sample
4 buffer is conditioned upon there being a sufficient number of valid call
signal samples available in said sample buffer to evaluate said signal
6 strength at said first path delay time.

18. The method of claim 16 for receiving and isolating one of said
2 call signals from among said group of call signals further comprising the
step of selecting an antenna from a plurality of available antennas to supply
4 said call signal samples.

19. The method of claim 16 for receiving and isolating one of said
2 call signals from among said group of call signals further comprising the
steps of:
4 storing a third received set of call signal samples in said sample buffer;
despreading a third fixed length set of call signal samples from said
6 sample buffer corresponding to a third path delay time with a second set of
PN sequence data bits from said PN sequence buffer to produce a third
8 despread output;
storing a fourth received set of call signal samples in said sample
10 buffer; and
despreading a fourth fixed length set of call signal samples from said
12 sample buffer corresponding to a fourth path delay time with said second set
of PN sequence data bits from said PN sequence buffer to produce a fourth
14 despread output;

wherein said fourth fixed length set of call signal samples comprises a
16 large number of the same call signal samples as said third fixed length set of
call signal samples and wherein the length of said third and fourth received
18 set of call signal samples is a fraction of the fixed length of said first and
second fixed length set of call signal samples.

20. The method of claim 19 for receiving and isolating one of said
2 call signals from among said group of call signals further comprising the
steps of:
4 determining a first call signal strength corresponding to said first
despread output;

- 6 determining a second call signal strength corresponding to said
second despread output;
8 determining a third call signal strength corresponding to said third
despread output; and
10 determining a fourth call signal strength corresponding to said fourth
despread output.

21. The method of claim 20 for receiving and isolating one of said
2 call signals from among said group of call signals further comprising the
steps of:
4 summing said first call signal strength and said third call signal
strength; and
6 summing said second call signal strength and said fourth call signal
strength;
8 wherein said first path delay time is the same as said third path delay
time and wherein said second path delay time is the same as said fourth
10 path delay time.

22. The method of claim 21 for receiving and isolating one of said
2 call signals from among said group of call signals further comprising the
step of providing a largest summed result to said modem microprocessor.

23. The method of claim 20 for receiving and isolating one of said
2 call signals from among said group of call signals wherein said step of
determining said first call signal strength comprises the step of decoding said
4 first despread output using a fast Hadamard transform to produce soft
decision data.

24. The method of claim 16 for receiving and isolating one of said
2 call signals from among said group of call signals wherein each of said
spread spectrum modulated call signals comprises a series of bits encoded in
4 groups of a fixed length into a series of symbols comprised of a series of code
bits.

25. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals wherein said series of bits
is Walsh encoded and said series of symbols are Walsh symbols.

26. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals wherein each of said code
4 bits of said one isolated call signal are modulated by a plurality of said PN
sequence data bits.

27. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals wherein each of said code
4 bits of said one isolated call signal are modulated by four of said PN sequence
data bits.

28. The method of claim 27 for receiving and isolating one of said
2 call signals from among said group of call signals wherein two call signal
samples are stored in said sample buffer for each PN sequence data bits.

29. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals wherein said limited size
of said sample buffer corresponds to two symbols worth of data samples.

30. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals wherein said PN sequence
data buffer is capable of storing four symbols worth of PN sequence data bits.

31. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals wherein first fixed length
set of call signal samples corresponds to one symbols worth of data.

32. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals wherein first receive set of
call signal samples corresponds to 1/32 of a symbol.

33. The method of claim 16 for receiving and isolating one of said
2 call signals from among said group of call signals wherein said in step of
storing said first and second receive set of call signal samples, said first and
4 second receive set of call signal samples are stored at the same rate at which
call signal samples are transmitted.

34. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals wherein a series of said

- 4 symbols are grouped together in a power control group wherein each symbol
in a common power control group is transmitted at a fixed power level.

35. The method of claim 24 for receiving and isolating one of said
2 call signals from among said group of call signals further comprising the
steps of:
- 4 despreading a third fixed length set of call signal samples from said
sample buffer corresponding to a third path delay time with a second set of
6 PN sequence data bits from said PN sequence buffer to produce a third
despread output;
- 8 despreading a fourth fixed length set of call signal samples from said
sample buffer corresponding to a fourth path delay time with said second set
10 of PN sequence data bits from said PN sequence buffer to produce a fourth
despread output;
- 12 wherein said fourth fixed length set of call signal samples comprises a
large number of the same call signal samples as said third fixed length set of
14 call signal samples;
- 16 determining a first call signal strength corresponding to said first
despread output;
- 18 determining a second call signal strength corresponding to said
second despread output;
- 20 determining a third call signal strength corresponding to said third
despread output;
- 22 determining a fourth call signal strength corresponding to said fourth
despread output.
- 24 summing said first call signal strength and said third call signal
strength; and
- 26 summing said second call signal strength and said fourth call signal
strength;
- 28 wherein said first path delay time is the same as said third path delay
time and wherein said second path delay time is the same as said fourth
path delay time and wherein said first fixed length set of call signal samples
30 and third fixed length set of call signal samples correspond to a common
power control group.

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